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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/803,227	03/16/2004	Keisei Fujiwara	16869N-110800US	5645

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EXAMINER

DOAN, DUC T

ART UNIT	PAPER NUMBER
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2188

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/803,227

Applicant(s)

FUJIWARA ET AL.

Examiner

Duc T. Doan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1-20 are in the application.

Claims 1-20 are rejected.

Information Disclosure Statement

2. The Information Disclosure Statements received 16 March 2004 and 12 October 2004 have been considered. See attached PTO-1449(s).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application

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filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1,3,6,7,9,11 ,13,14,16,19,20 rejected under 35 U.S.C. 102 (e) as being anticipated by Singhai (US Pub 2005/0055406).

As for claims 1 and 13,14,20, Shinghai describes a storage device (Singhai's Fig2: #203) communicating with a host computer (Singhai's Fig 2: #201 Local Host) and another storage device through a network, said storage device comprising:

an available buffer (Singhai's Fig 2: #206 buffer in memory pool) including a plurality of memory buffers [The communication control data structure, the process buffer, and the reserve buffer are allocated from unallocated free memory objects disposed in a global memory pool, Shinghai's page 2, paragraph 10, lines 2-6];

an in-use buffer (Singhai's Fig 2: #221,223 TXB, RXB transmit, receive process buffers) including a plurality of memory buffers allocated as memory buffers dedicated for already communications [Multiple process buffers may be allocated from unallocated free memory objects to the communication control data structure, with selected ones being designated as transmit process buffers. The transmit process buffers store messages being transmitted from the local host to the remote host. Similarly, of the multiple process buffers allocated, selected others can be designated as receive process buffers. The receive process buffers store messages being received from the remote host by the local host; Shinghai's page 2, paragraph 11, lines 1-9];

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notification means for giving a notice (with an appropriate perceptible message) of an available-buffer size to an external inquirer in response to an inquiry (resource request) made by the external inquirer; buffer securing means for taking memory buffers having a reserved-buffer size specified (size determined by the communication buffer manager) in addition buffer-reservation target in a request made by an external requester as a request for a buffer reservation out of said available buffer and reserving said taken memory buffers as a reserved buffer for said buffer-reservation target in response to said request for a buffer reservation [Instantiation phase 301 in FIG. 3B can begin with an incoming request for resources (Operation 302), for example, from a local communication process. The resource requested can be a new communication socket or, if so configured, for additional resources to be used with an existing communication socket. Communication buffer memory can be analyzed to determine whether sufficient memory may be available to fulfill the incoming resource request (Op. 303). When free, unallocated memory may be insufficient to create a requested resource, creation can be aborted (Op.305), with an appropriate perceptible message; Shinghai's page 12, paragraph 87; Certain communication buffer managers may be configured to select the size, number, or both, of process buffers and of reserve buffers, responsive to an anticipated buffer size, an intended communication purpose of the local communication interface, a predetermined communication parameter, and a combination thereof; Shinghai's page 3, paragraph 28, lines 1-6]

allocation means for allocating said memory buffers of said reserved buffer to said buffer-reservation target to make them said allocated memory buffers a part of said in-use buffer (TXB, RXB) in response to a request made by the external requester as a request to start an application [Typically, at the beginning of a communication, processes executing on either host

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negotiate a connection there between, using a selected communication interface; Shinghai's paragraph 51, lines 1-3; After initially being allocated from unallocated free memory pool 206, memory objects SCB #1 240, TXB #1 221, RXB #1 223 can be designated as allocated free memory or allocated committed memory. Shinghai's paragraph 66, lines 22-26]; and execution means (Fig 2: #259 FSM finite state machine) for executing the application communication by using said in-use buffer allocated by said allocation means [In certain embodiments, socket control blocks may be instantiated and process buffers allocated with the cooperation of global memory pool 213, with process buffer manager 250 and, perhaps, finite state machine or state controller 259; Shinghai's page 10, paragraph 69, lines 9-12].

As for claims 3 and 16, the rejection in claim 1 is incorporated herein. The claim recites a storage device according claim further comprising:

means for taking memory buffers having an additional size out of said available buffer and adding said taken memory buffers the reserved buffer allocated the buffer-reservation target in response to a reserved-buffer-updating request made by the external requester as a request to increase said reserved buffer by specifying said buffer-reservation target and a value greater than the present size of said reserved buffer as a new size of said reserved buffer; and

means for taking memory buffers having a decreasing size out of a reserved buffer allocated to a buffer-reservation said reserved buffer; and target and returning said taken memory buffers to said available buffer when decreasing said reserved buffer by specifying said buffer-reservation target and a value smaller than the present size of said reserved buffer as a new size of said reserved buffer. Shinghai describes using the size value to allocate buffer [A nominal

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maximum size of an UDP datagram may be n buffers. Thus, it may be desirable to allocate n TRB from global memory pool 213 to UDP socket S2, as well as n RRB; Shinghai's page 10, paragraph 70, lines 8-11; and paragraph 71]. Shinghai describes the allocation of memory objects may be performing continuously (paragraph 72, lines 18-19). Shinghai describes the reclaim, allocation, re-allocation methods among process buffer, reserve buffer and memory pool [Although reserve buffers RR 127 and RT 129 may represent memory objects allocated to SCB 125 during its creation, they also may represent memory objects later added by CBM 130 by supplemental allocation during operations, or by reclamation and re-allocation; paragraph 57 and 58; After a committed reserve buffer is designated as a free reserve buffer, however, it may be reclaimed and returned to unallocated free memory for re-allocation, if the memory management strategies implemented in communication buffer manager are so adapted; Paragraph 73, lines 15-19].

As for claims 6 and 19 , Shinghai describes a storage device according to claim 1 or 4 wherein said buffer-reservation target is combination consisting of a port pair and a number indicating a protocol adopted by said application executed by said another storage devices, said port pair being a pair of a network port of said storage device and a network port of said another storage device [Typically, each computer communicating on a network can be assigned a logical identifier, for an example, an IP address. Similarly, a logical identifier, which may be a port number, can be assigned to an access point on a respective computer for a communication process running on a network. Together, the computer identifier and the port number may be arranged to identify the access point, or socket, by which a communicating

process on a local host may communicate messages with a communicating process on a remote host; Shinghai's page 9, paragraph 63, lines 12-21].

As for claim 7, Shinghai describes a storage device according to claim 1 wherein said buffer-reservation target is a connection between said storage device and a device serving as communication partner [In an example where each of REMHOST 110 and LHOST 102 use a TCP-like transport protocol to effect communication, each process may create one or more TCP sockets to establish a desired connection there between; Shinghai's page 7, paragraph 51, lines 1-37].

As for claim 9, Shinghai describes a storage device according to claim 1 wherein said buffer is a buffer for storing data transmitted by adopting a TCP [Shinghai's page 9, paragraph 66].

As for claim 11, the claim recites a storage device according to claim 1 wherein said buffer is a credit for storing data transmitted by adopting fibre-channel protocol. Shinghai does not describe the claim's detail credit buffer aspect. However, Comento describes a fibre-channel's buffer-to-buffer credit mechanism (Comento's page 3, paragraph 35, 36). It would have been obvious to one of ordinary skill in the art at the time of invention to include the buffer credit mechanism as suggested by Comento in Shinghai's system to enhance the integrity of data transferring in a network [Fibre channel, however, does not allow the dropping of packets; Comento's page paragraph 35, lines 1-2].

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(e) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Shinghai (US Pub 2005/0055406) as applied to claim 1, and further in view of Helmy (US Pub 2005/0025150).

As for claims 2 and 15 , the claims recite a storage device according to claim 1 wherein said reserved-buffer size is a product obtained as a result of multiplying a bandwidth by a latency where said bandwidth is defined as an amount of data transmitted in a unit time through a connection whereas said latency is defined as a time period from a time of transmitting data through said connection to a time receiving an acknowledgement of said data. Shinghai does not describe the claim's detail of the reserve-buffer size. However, Helmy describes a proxy

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device capable to buffer data in an amount of the TCP window size; wherein the TCP window size is the product of the bandwidth times the expected latency delay [The TCP window size thus defines the amount of time that a sender will wait for an acknowledgement from a receiver before sending any more data. Thus, after sending an initial block of data once the window size limit is reached, the sender will stop sending data until an acknowledgement from the receiver is returned. Helmy's paragraph 6; In order to achieve maximum performance, it has been suggested to set the window size to approximately the product of the bandwidth times the expected latency delay; Helmy's paragraph 7, lines 1-3; After being buffered, the proxy application allocates the data among the N persistent TCP connections. The data is then sent to the remote network accelerator at the other end of the proxy; Helmy's paragraph 36, lines 7-9]; It would have been obvious to one of ordinary skill in the art at the time of invention to include the size algorithm as suggested by Helmy in Shinghai's system to improve the bandwidth and reduce latency [one common way to improve the bandwidth and reduce latency while still using TCP on a reliable high-speed network is to tune the so-called "window size" appropriately; Helmy's page 1, paragraph 4].

Claims 4,5,8 ,12,17 and 18 rejected under 35 U.S.C. 103(e) as being unpatentable over Shinghai (US Pub 2005/0055406) as applied for claims 1 and 14 respectively , and further in view of Row et al (5931918).

As for claims 4-5 and 17-18 correspondingly, the claims recite a storage device according to claim 1 wherein said application is a remote copy reproduction process to copy data stored in

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said storage device to said another storage device. Shinghai does not describe the device wherein the application is a remote copy of data. However, Row describes a file server architect with network controller unit, file controller unit and storage controller unit capable of directly transfer data in a network environment, using NFS (network file system) protocols over TCP/IP layers (Row's column 7, lines 66-67, column 8, lines 1-30]; wherein said buffer-reservation target is an inter port (port of a LAN network) communication between a network port of said storage device and a network port of said another storage device [While the network controller described here is designed for Ethernet LANs, it will be understood that the invention can be used just as readily with other network types, including FDDI; Row's column 10, lines 1-4].

It would have been obvious to one of ordinary skill in the art at the time of invention to include the file architect as suggested by Row in Shinghai's system to processing NFS requests in parallel in order to improve the file server performance [Since the vast majority of messages to and from clients over the Ethernets 122 involve NFS requests and responses, the processing of these requests in parallel by the NC, FC and SP processors, with minimal involvement by the local host 118, vastly improves file server performance. Unix is explicitly eliminated from virtually all network, file, and storage processing; Row's column 8 lines 28-35].

As for claim 8, the rational in the rejection of claims 1 and 4 are incorporated herein. the claim recite means which includes a cache memory for temporarily storing data read out from disks and gives a notice of an available storage capacity of said cache memory to the external inquirer in response to an inquiry made by the external inquirer; Shinghai does not describe the

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claim's detail of a cache. However Row describes a memory cache (Fig 2: # 116a-d) couples to disk subsystem via storage processor (Fig 2: #114b SP) [The FC 112 first searches the system memory 116 buffer cache for the requested data; Row's column 10, lines 23-25; Additionally, coordinated by a Server Manager in the host 118, storage processor 114 can execute server backup by moving data between the disk subsystem and tape or other archival peripherals on the SCSI channels. Further, if directly accessed by host processor 118, SP 114 can provide a much higher performance conventional disk interface for Unix, virtual memory, and databases. In Unix nomenclature, the host processor 118 can mount boot, storage swap, and raw partitions via the storage processors 114; Row's column 10, lines 46-54];

As for claim 12, the claim recites wherein a storage device according to extraction means for allocating buffer allocates an area usable case said available buffer (cache memory) is insufficient. Shinghai does not describe the situation where the memory allocated in a cache is insufficient. However, Row describes a hierarchical memory system, wherein a cache LRU algorithm to provide more allocation pages in cache [When an NC receives an NFS read request from a client workstation, the resulting LNFS request passes to the FC 112. The FC 112 first searches the system memory 116 buffer cache for the requested data. If found, a reference to the buffer is returned to the NC 110. If not found, the LRU (least recently used) cache buffer in system memory 116 is freed and reassigned for the requested block; Row's column 10, lines 22-28].

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It would have been obvious to one of ordinary skill in the art at the time of invention to include the cache memory as suggested by Row in Shinghai's system to quickly obtain data in cache in order to further improve the file server performance [the processing of these requests in parallel by the NC, FC and SP processors, with minimal involvement by the local host 118, vastly improves file server performance. Unix is explicitly eliminated from virtually all network, file, and storage processing; Row's column 8 lines 28-35].

Claim 10 rejected under 35 U.S.C. 103(a) as being unpatentable over Shinghai (US Pub 2005/0055406) as applied for claim 9, further in view of Helmy et al (US Pub 2005/0025150), Row et al (5931918).

As for claim 10, it rejected based on the same rational as in claims 2 and 4.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duc T. Doan whose telephone number is 571-272-4171. The examiner can normally be reached on M-F 8:00 AM 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on 571-272-4210. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DD

Mano Padmanabhan
3/19/05

**MANO PADMANABHAN
SUPERVISORY PATENT EXAMINER**